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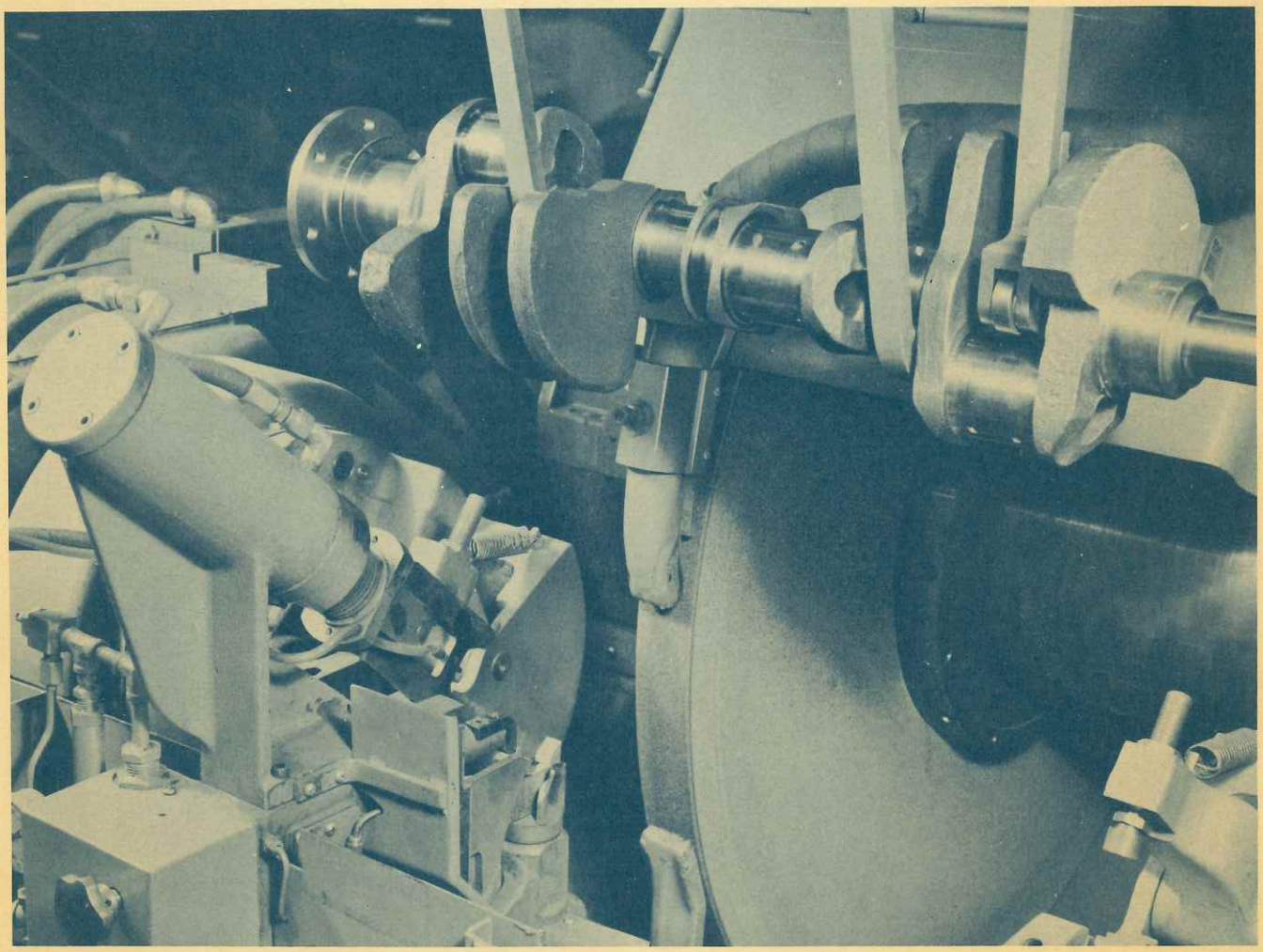
N O R T O N

TRANSFER TYPE

CRANKPIN GRINDING MACHINE



NORTON COMPANY WORCESTER 6, MASS.

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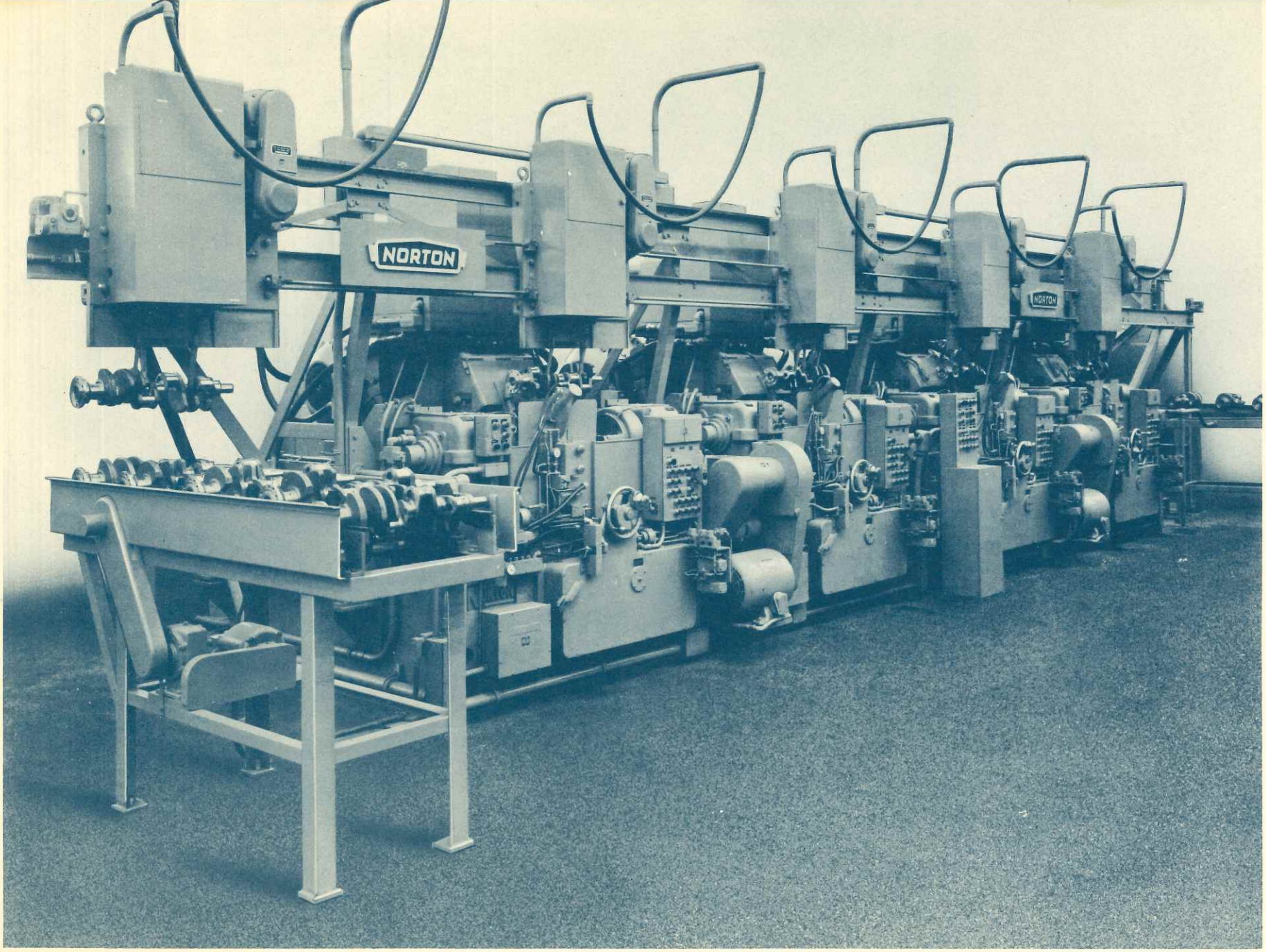
See patent 2,780,895 51/215.4 XR



NORTON TRANSFER TYPE CRANKPIN GRINDING MACHINE

THE NORTON TRANSFER TYPE CRANKPIN GRINDER

This first completely automatic crankpin grinder providing fully automatic handling, locating, grinding, gaging and wheel truing is rapidly being accepted in automotive plants as the answer to the problem of automation of one of the toughest cylindrical grinding operations in the automotive field.

The problems in grinding the crankpin bearings of automotive crankshafts are complicated by the fact that precise angular as well as endwise location is required in placing the crankshaft in the work holders on the driving heads. Exact angular location must be provided to bring each crankpin into perfect alignment with the axis of rotation of the driving heads.

All these conditions exist in modern conventional crankpin grinders but here the placing of the shaft in the work holders, and locating for angularity and shoulder distances is a function of the operator. The new Transfer Type Crankpin Grinder takes over these operator functions and does them mechanically and automatically, and also repeats automatically in a continuous production cycle.

In addition to taking over the loading and unloading duties of the operator, the Transfer Type Grinder automatically trues the grinding wheels after a predetermined number of grinds as determined by the stock removal, nature of the material and the finish requirements, consistent with the best wheel economy.

Built in Sections

The machine is built in sections, each base section mounting two grinding wheel slides moving on long and wide ways. Space limitations at the machine tool show permit showing only one section - half of the complete setup for a four-throw or V-8 crankshaft. The grinding wheels, 42" in diameter, are individually driven from motors mounted on the wheel slides. Each base section has a work drive which delivers power to two sets of work drive heads with their work holders through a common drive shaft. The crankshafts are held in the work holders by hydraulically operated clamps which are automatically closed before the work head spindles start to revolve.

Work head spindles are of more than ample diameter and supported in large super-precision antifriction bearings. The grinding wheel spindles are of exceptionally rugged proportions and run in hard bronze bearings with the grinding wheel mounted between the bearings.

Transfer and Location

The transfer mechanism consists of a fabricated steel framework supporting an overhead track extending from the loading to the unloading conveyor lines. Transfer heads moving simultaneously along the track carry hooks that pick up the crankshaft from the initial loading station, and other crankshafts from each of the grinding stations, depositing them in the next grinding station to the right. The crankshaft from the last station is deposited at the unloading conveyor. When all the loaders have disposed of their crankshafts, they all move to the left to the original positions, thus completing the cycle. The hooks on the loaders are so

constructed as to turn the crankshaft, while it is being lifted, to the approximate angular position for the next grinding station. Accurate angular location is established by a locating plunger on the left-hand work head entering a hole in the crankshaft flange.

Lateral or endwise location of the crankshaft positions it with relation to the grinding wheel so that an equal amount of stock will be ground from each side wall. This is accomplished by a hydraulically operated device which contacts the side walls and slides the shaft in the open work holders to exact position. With the shaft in position, the work holders are clamped and the grinding cycle begins.

Compensation for Wheel Wear

Automatic wheel truing, to be complete, must include automatic wheel feed compensation for the amount worn and trued from the wheel. This is accomplished by a mechanism that automatically advances the wheel feed the same amount as the diamond is advanced, thus taking care of another operator function in conventional grinding.

Gaging

Automatic gages in contact with each crankpin as it is ground control the size within the prescribed tolerances by automatically terminating the wheel feed when size is reached and causing the wheel slide to retract. Not until all of the wheel slides have been retracted can the work heads be stopped and the cranks unclamped for the automatic removal of the ground shaft and depositing an unground shaft in each of the stations.

The four-station machine for V-8 crankshafts, including all floor mounted control cabinets, requires a floor space 18 x 45 feet and weighs about 140,000 pounds. Four 25 H.P. D.C. variable speed motors drive the grinding wheels, two 5 H.P. motors drive the four pairs of work heads and five 1/2 H.P. motors operate the transfer heads. Other motors operate the hydraulic equipment and oil pumps.

Production rates for grinding all the crankpins of a crankshaft is comparable to that obtained by a modern conventional crankpin grinder grinding a single crankpin. Since the machine is completely automatic, operator fatigue is not a factor and operating efficiency approaches 100%.